Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 22. October, 1920. No. 262.

SCIENTIFIC NAMES APPLICABLE TO OUR PURPLE-FLOWERED EUPATORIUMS

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IN a very interesting article in a recent number of RHODORA (**22**: 57) Prof. K. M. Wiegand deals at length with "Eupatorium purpureum and its Allies." His conclusion that there are four distinct and well-marked species in this group will, I believe, find ready acceptance among those who have devoted field study to it. In the vicinity of New York we are well acquainted with three of the species, carefully described in the various editions of Wood's Botany; and from herbarium material had judged there was an additional species of northern range not known in our immediate neighborhood.

But when it comes to applying names occurring in botanical literature to the various species recognized, one does not find himself at all in agreement with the application of names made by Prof. Wiegand. As the plants dealt with are very conspicuous and abundant members of our flora, it seems worth while to go into the questions involved at some length and to consider in detail the evidence available as to the identity of some of the species proposed by the earlier botanists.

In order to lead to a clear discussion of the problems involved let us give the four species numbers in the same way as done by Prof. Wiegand and give to each its distinguishing characters taken from his paper.

1. Leaves ovate to ovate-lanceolate, abruptly contracted into the petiole, more or less 3-nerved; plant somewhat viscid, scabrous-puberulent, with a strong odor when fresh: stems finely purple-specked, not glaucous: inflorescence convex: leaves in 3's or 4's, very rarely in 2's or 5's: florets 6–9, rarely 5–12. Along the Coastal Plain from eastern Massachusetts and southern New Hampshire to South Carolina. A plant of wet soil.

2. Leaves elliptic-ovate or elliptic-lanceolate or ovate-oval, tapering at the base, 3-nerved or pinnately veined; plant not viscid and not odorous; stem speckled or sometimes deep purple all over, not glaucous: inflorescence or its divisions flat-topped; leaves in 4's or 5's, rarely in 3's or 6's: florets 9–15, rarely 8–20, scarcely exserted. Newfoundland through Northern New England to western Connecticut and central Pennsylvania, westward to Illinois and Colorado, New Mexico and British Columbia. A plant of wet soil.

3. Leaves elliptic-lanceolate, tapering at the base, pinnately veined; plant not viscid and not odorous; stems rarely speckled, fistulose, purple, plainly glaucous; inflorescence convex; leaves in 4's to 6's, rarely in 7's, bluntly toothed; florets 5–7, rarely 3–8, scarcely exserted; corollas 3.5–4.8 mm. long, very rarely longer. Southern Maine and Rhode Island to Florida, Texas and Oklahoma; also in western Pennsylvania and Ohio. A plant of damp woods and pastures on the Atlantic Coast and Uplands.

4. Leaves lanceolate, ovate-oval or ovate, tapering at the base, pinnately veined; plant not viscid and not odorous; stems rarely speckled, solid, green with purple nodes, faintly glaucous; inflorescence convex; leaves in 3's or 4's, very rarely in 2's or 5's, sharply toothed; florets 5–7, rarely 3–8, much exserted; corollas 5.5–7.5 mm. long; heads paler than in the other species. Eastern Massachusetts and southern New Hampshire westward to Wisconsin and southward to Pennsylvania, Kentucky, Oklahoma and Nebraska; also in the mountains from Virginia to Georgia. A plant of rich upland woods, rarely found near the coast.

Eupatorium purpureum L.

Let us first take up the problem of the identity of *Eupatorium purpureum* L. itself. The original Linnaean description (Sp. Pl. 838) is as follows:

"EUPATORIUM foliis subverticillatis lanceolato-ovatis serratis petiolatis rugosis.

"Eupatorium foliis verticillatis. *Cold. noveb.* 180.

"Eupatorium foliis ovato-lanceolatis obtuse serratis in petiolos desinentibus. *Gron. virg.* 93.

"Eupatorium enulae folio. *Corn. canad.* 72. *t.* 72

"Eupatorium canadense elatius, longioribus foliis rugosis integris & caulibus ferrugineis. *Moris. hist.* 3. *p.* 97. *s.* 7. *t.* 13. *f.* 4.

"β. Eupatorium foliis lanceolato-ovatis serratis petiolatis, caule erecto. *Hort. cliff.* 396. *Roy. lugdb.* 155.

"Eupatorium novae angliae, urticae foliis. floribus purpurascentibus, caule maculato. *Herm. par.* 158. *t.* 158. *Moris. hist.* 3. *p.* 97. *s.* 7. *t.* 18. *f.* 3. *Raj. suppl.* 187.

"*Habitat in* America *septentrionali.* ♃

"Caulis *teres, erectus, viridis, punctis linearibus longitudinalibus purpurascentibus.* Folia *terna, quaterna, s. sena, lato-lanceolata s. lanceolato-ovata, serrata, rugosa, scabriuscula, petiolata, utrinque viridia.* Corymbus *terminalis.* Calyces *florum incarnati.* Flosculi *octo, Corollis albidis, Antheris purpureis, stylis longissimis.*"

Before taking up the diagnosis of Linnaeus let us consider in their order the citations from the older works given by him.

1. Colden's description (not seen by Prof. Wiegand) calls for a very tall plant with leaves in sixes, sometimes in fours or fives, growing "in humidis" and having light purple corollas. I would identify this with Species No. 3.

2. Clayton's plant is described by Gronovius as having ovate-lanceolate leaves obtusely serrate tapering into the petiole. This is identified by Prof. Wiegand as Species No. 3, and in this identification I agree.

3. Cornut's description and plate is next cited by Linnaeus. The plate represents the complete plant and shows rather wide strongly serrate leaves in fours. It presumably came from Canada like the rest of Cornut's plants. Prof. Wiegand identifies this plant with No. 3 because in the description Cornut says "caules rubescentes (cineres tamen colore suffusi) * * inanes intus," although, as he states, Species No. 3 is not known in Canada.

The plate is most certainly not one of Species No. 3, and I can see nothing in the words quoted from Cornut not applicable to the common Canadian plant No. 2. I would therefore identify this plant as Species No. 2.

4. The next citation by Linnaeus is from Morrison. As stated by Prof. Wiegand his plate seems to have been copied from Cornut and

his description is copied from Cornut. His plant is therefore also identified by me as Species No. 2.

5. Coming next to the first plant referred to under β. we find a plant from New England with serrate lanceolate-ovate leaves called for. This specimen is in the British Museum and a photograph has been identified by Prof. Wiegand as Species No. 1. This identification would seem to me to be correct.

6. Hermann's plate next cited by Linnaeus is likewise identified by Prof. Wiegand as Species No. 1. The description certainly strongly points towards Species No. 1, and the plate also seems to me undoubtedly to belong to that plant.

7. Morrison's figure is to me much more doubtful, but I would agree with Prof. Wiegand that it also probably belongs to Species No. 1.

8. The citation from Ray is also here referred by Prof. Wiegand because of the number of leaves shaped like a nettle and the spotted stem. In this reference to Species No. 1 I would also agree.

So summarizing the references given by Linnaeus, we find the first two refer to Species No. 3, the second two refer to Species No. 2, and all under β refer to Species No. 1. If we were left here we would have a rather bad problem to solve, as to the proper application of the name of Linnaeus; but fortunately Linnaeus supplied a description of his own and from it we can be sure that he had an actual specimen before him. The more one reads this description the more one feels sure that it is based almost entirely on Species No. 1. Surely the phrases "caules * * * punctis linearibus longitudinalibus purpurascentibus. Folia terna, quaterna * * lato-lanceolata s. lanceolato-ovata, serrata, scabriuscula. Calyces florum incarnati Flosculi octo," can only refer to this plant. The only part of the description not applicable is the one word that the leaves are sometimes in sixes. It can be surmised however that Linnaeus inserted this phrase from Colden in the desire to make his description complete and not being aware that he had more than one plant to deal with. It would seem that Linnaeus had the Hortus Cliffortianus plant before him when he drew his description as surmised by Prof. Wiegand. I must confess that with this description before us, and about the applicability of which to Species No. 1 Prof. Wiegand has no more doubt than have I, it is not possible for me to follow Prof. Wiegand in applying the name *Eupatorium purpureum* to Species No. 3.

He is led to do this because in the second edition of the Species Plantarum (p. 1173) Linnaeus gave a partially new description of *Eupatorium purpureum*, the changes self-evidently being based on a specimen of Species No. 4. It is to be noted that certain phrases quoted by Prof. Wiegand from the description in the second edition as being particularly applicable to Species No. 3, are in truth copied from the description in the first edition and are based on Species No. 1.

But to me it seems absolutely immaterial what Linnaeus did after he published his species. It seems to me that we can identify the plant which he had before him and on which his own description was based. This being the case we are not justified in disregarding his description and resorting to the works of the earlier botanists to determine the application of his name, merely because in a later work he confused the first plant studied by him with another. As I see it the type, as we now call it, of *Eupatorium purpureum* was the plant from which he drew his own description, quite probably the Hortus Cliffortianus plant; and it is this plant to which the name should be applied. This plant is the Species No. 1 of this paper, and is the plant commonly identified in botanical manuals as *Eupatorium maculatum*. It is illustrated as such in Addisonia (pl. 132).

Eupatorium maculatum L.

Let us next consider the above species. The original description (Amoen. Acad. **4**: 288. 1755) is as follows:

"76. EUPATORIUM (*maculatum*) foliis quinis tomentosis lanceolatis aequaliter serratis petiolatis venosis.

"Eupatorium foliis lanceolato-ovatis serratis petiolatis, caule erecto. *Hort. cliff.* 396.

"Eupatorium novae angliae, urticae foliis, floribus purpurascentibus, caule maculato. *Herm. parad.* 158. *t.* 158. *Moris. hist.* 3. *p.* 97. *s.* 7. *t.* 18. *f.* 3. *Raj. suppl.* 187.

"*Habitat in* America *septentrionali.* 2

"*Descr. Folia* quinque vel sex ad genicula, lanceolata, aequaliter serrata. *Caulis* tenuissime maculatus. Varietas *Eupatorii purpurei* ad hoc, ut & ejus synonyma & descriptio spectant. Eupatorium enim *purpureum* foliis quaternis, lanceolato-ovatis, inaequaliter serratis, rugosis est."

The above is certainly a very sad mixture. Linnaeus is evidently attempting to remove from *Eupatorium purpureum* the plant with equally serrate, veiny, lanceolate leaves occuring in 5's or 6's at the

nodes; as contrasted with this he describes *Eupatorium purpureum* as having lanceolate-ovate leaves in 4's and says the leaves are unequally serrate and rugose. Unfortunately he transferred the wrong citations. The first two of those kept by him under *Eupatorium purpureum* answer his description of *E. maculatum*, while none of the citations transferred by him to *E. maculatum* answer his description of that species, but all answer his description of *Eupatorium purpureum*. These citations have already been discussed at length above, and it is undoubtedly on the basis of the disposal by Linnaeus of these citations that the name *Eupatorium maculatum* has come into use for Species No. 1 of this paper.

It would therefore seem plain that in making this transfer Linnaeus got things mixed. Certain it is that his description of *Eupatorium maculatum* more nearly accords with the descriptions of previous authors left by him under *Eupatorium purpureum* than it does with the descriptions from previous authors cited by him under *Eupatorium maculatum*. Under these circumstances, I would follow Prof. Wiegand and be governed by the description of Linnaeus rather than his citations.

But this being done we have to solve the even more troublesome problem of what Linnaeus was describing. Prof. Wiegand applies his description to Species No. 2, based on a photograph of a specimen collected by Kalm from the herbarium of Linnaeus. He says this "shows six leaves in the whorls (though unusual even for this species) and in every way answers the description of *E. maculatum* given by Linnaeus."

It seems very doubtful to me whether Linnaeus was describing this plant at all. It seems to me that what he was attempting to do was to eliminate from *Eupatorium purpureum* everything which had more than four leaves in a whorl and which were equally serrate. At least this is what he says. I find nothing in his description which would lead one to believe that it is based on some particular specimen. The description is too general for that.

The plant which his description answers the best is Species No. 3—a plant which always has lanceolate leaves equally serrate in 5's or 6's and also has stems very slenderly spotted. Therefore I am applying the name to Species No. 3—the plant so well described by Barratt under the name *Eupatorium fistulosum*.

Eupatorium trifoliatum L.

The first species of this group described if page priority is taken into consideration is the above species. The description (Sp. Pl. 837) reads as follows:

"9. EUPATORIUM foliis ternis.

"Eupatorium caule erecto, foliis ovato-lanceolatis serratis petiolatis ternatis. *Gron. virg.* 178.

"Eupatorium cannabinum, foliis in caule ad genicula ternis, marilandicum. *Raj. suppl.* 189.

"*Habitat in* Virginia."

Nothing of value is to be found in the description of Ray, but the description of Gronovius deserves full quotation. It is as follows:

"*EUPATORIUM caule erecto: foliis ovato-lanceolatis, serratis, petiolatis, ternatis.*

"Eupatorium floribus albis, in panicula laxa terminatrice dispositis: foliis ovato-lanceolatis, petiolatis, ad genicula semper ternis, per intervalla haud semipedalia a se invicem distantibus: caule singulari non ramoso. In solo pingui & umbrosis locis inter Verbesinas et Serratulas initio Augusti floret. *Clayt. n.* 620."

Prof. Wiegand identifies the above rather doubtfully with Species No. 3, basing his identification on a photograph of Clayton's 620 from the British Museum. He says "the leaves are lanceolate, bluntly and finely toothed; and so far as can be made out from the print, the stem is purple and glaucous and not darker at the nodes. The stem is also cracked in one place in a manner more likely to occur if it were hollow. Also, as has already been stated, No. 3 is more likely to have been found by Clayton than No. 4. However, no species normally has leaves of this form in 3's. The specimen seems abnormal, but is more reasonably placed in No. 3."

It seems to me that this identification is unfortunate and that in making it the description from Gronovius has not been given due consideration. When it is considered that Species No. 3 is the largest of all our purple-flowered Eupatoriums and is characterized by its narrow leaves in 5's or 6's and that it rarely has leaves in 3's and then only near the flowers—never in my experience in the main whorls—one can well understand the dislike I feel to applying the name *Eupatorium trifoliatum* to this plant. But this does not seem to me to be the proper course. As far as I can see the name applies to Species No. 4 or possibly a closely allied species. In support of this view the following points are to be noted.

(1) The leaves are said to be "semper ternis"; this phrase well applies to specimens of Species No. 4, but it is not applicable to Species No. 3 at all.

(2) The leaves are further described as ovate-lanceolate and serrate, words thoroughly applicable to Species No. 4, and to be contrasted with the description of Clayton's No. 162 by Gronovius "foliis ovato-lanceolatis obtuse serratis, in petiolos desinentibus" (Gron. Virg. 93). It is of course to be remembered that this plant last referred to has been identified both by Prof. Wiegand and myself as Species No. 3. and it is cited by Linnaeus under *Eupatorium purpureum*. I would think it more probable that Clayton and Gronovius had two different species in mind rather than that the two descriptions referred to the same plant.

(3) The flowers are described as white. Prof. Wiegand himself states that the flowers of No. 4 are lighter in color than the flowers of the other species. They are in fact often very light colored indeed as I am acquainted with the plant.

(4) In the Torrey herbarium there are certain excellent specimens from the southern mountains. These are complete specimens of a slender plant with all the leaves in 3's and the floweers very light colored. They to my mind exactly answer the description from Gronovius, and I think the name *Eupatorium trifoliatum* should apply to them. I am not sure that they are quite the same as Species No. 4, but they are certainly very close to it.

(5) Clayton's plant grows "in solo pingui and umbrosis locis"—words quité applicable to the habitat given by Prof. Wiegand for Species No. 4 "a plant of rich upland woods;" but scarcely applicable to the habitat given by him for Species No 3 "a plant of damp woods and pastures."

It seems to me that Prof. Wiegand lays too much stress on the photograph of what is said to be a specimen of Clayton's 620 in the British Museum. One cannot say that it agrees with the description given in Gronovius, which seems to have been taken from living plants. It is noticeable, however, that the description given by Prof. Wiegand of the plant shown in this photograph does agree with the description under Clayton's 162 referred to above, and the query naturally arises whether the specimen photographed did not get mixed up by some one and whether it does not really represent Clayton's 162 instead of his 620. In this connection it is to be noted

that Prof. Wiegand does not seem to have been able to discover material of Clayton's 162.

In any event, as has often been pointed out (S. F. Blake, RHODORA **20**: 21), one is not justified in laying stress on a specimen preserved in an old herbarium and taking it as the type of a species, unless it agrees with the diagnosis of the species given by the author. In the present case as the specimen preserved does not accord with the description I think it should not govern and as the description does exactly answer a plant now known from Virginia I think it should be applied to it.

In conclusion then I would use the following names:

(1) Species No. 1. *Eupatorium purpureum* L.
(2) Species No. 2. *Eupatorium Bruneri* A. Gray (probably)
(3) Species No. 3. *Eupatorium maculatum* L.
(4) Species No. 4. *Eupatorium trifoliatum* L. (provisionally)

NEW YORK CITY.

LIGHT CORRELATED VARIATIONS OF THE STERILE STEM OF EQUISETUM SYLVATICUM.

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A FAIRLY abundant growth of *Equisetum sylvaticum* L. was observed at Bellevue, Pennsylvania. One section of the growth was constantly well shaded, while the other had the benefit of sunlight throughout the day. In corroboration of the differences appearing at first sight between the plants of these two sections, one hundred plants from each were collected and the following tabulations made.

NUMBER OF ESTIMATED WHORLS PER PLANT

Classes	7	8	9	10	11	12	13	14	15
Sun			5	4	14	25	23	15	12
Shade	1	2	3	8	18	23	28	13	4

A conclusion derived from the above is that plants of this species growing in the sun have on the average a larger number of whorls